Count on Sleep | Obstructive Sleep Apnea Awareness

# Case Vignette: OSA and Fever

## Presenting Complaints

A 47-year-old man presented to his family physician with fever and malaise on and off for about 3 months. He said his fever was low grade and in the 98.5- 100.2°F range, but his lack of energy and "generally feeling low" has led to an increased absence from work, leading to a loss of pay. He stated that his daily social life is disturbed. He works as a livestock driver on a farm.

## Past History

The patient has a history of diabetes mellitus, dyslipidemia, and hyperuricemia. He is on medications for each one of them and they include febuxostat, fenofibrate, lansoprazole, linagliptin, metformin, miglitol, olmesartan, and repaglinide. The patient has a history of snoring and has gained more than 20 lb. in the past year before the visit. Diabetes mellitus was exacerbated due to decreased physical activity.

He has no history of illegal drug use. Though he works on a farm, he stated that he was not exposed to pesticides.

## Physical Exam

A physical examination revealed no pharyngeal or tonsillar abnormalities, heart murmurs, abnormal sweating, necrosis of the skin, or lymphadenopathy.
No upper or lower respiratory tract symptoms, abdominal symptoms, skin rashes, and joint pain were noted.

- Blood pressure: 137/93 mmHg
- Axillary body temperature: 99°F
- BMI: 34 kg/$m^2$

## Testing

Blood tests, including an interferon-γ release assay revealed no inflammatory findings or abnormalities that could cause a fever. A transthoracic echocardiography revealed no signs of infective endocarditis. Non-contrast whole-computed tomography revealed no obvious abnormalities other than a fatty liver.

In the absence of elevated inflammatory markers, and a temperature marginally surpassing 99 °F in the last 3 months, the family physician diagnosed the patient with fever of unknown origin (FUO) and proceeded to assess the mental and physical stressors for the same. The patient's history of snoring and recent weight gain of over 20 lb. raised concerns about

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potential sleep apnea as a stressor. This prompted the family physician to ask the patient to fill out the STOP BANG questionnaire.

*[The STOP-Bang questionnaire is a quick and easy screening tool with eight dichotomous (yes/no) items to assist in triaging patients with suspected OSA. It consists of 4 self-reportable (STOP: snoring, tiredness, observed apnea, and high blood pressure) and 4 demographic (Bang: body mass index [BMI; calculated as weight in kilograms divided by height in meters squared], age, neck circumference, and gender) items.]*

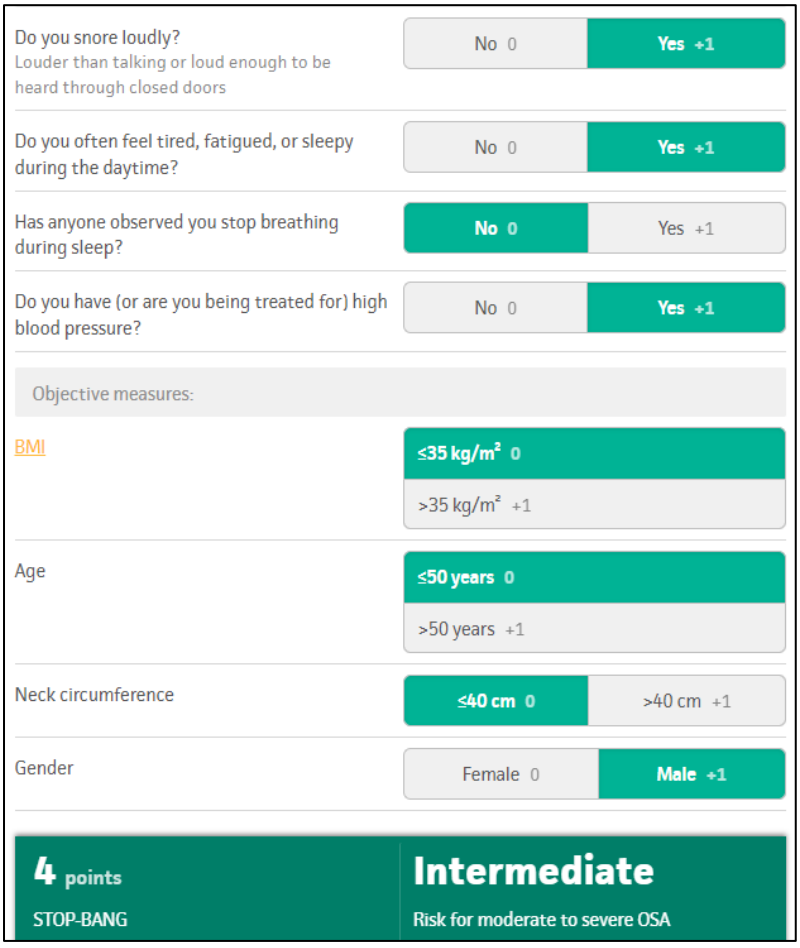


**Figure 1. Results of STOP-Bang Questionnaire**

The patient's STOP BANG score of 4 (Figure 1) suggested an intermediate risk for moderate to severe OSA. [about the STOP-Bang]

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He wrote a referral for a sleep physician stating that the patient has "functional hyperthermia" , an unrecognized cause of FUO, possibly secondary to OSA as a stressor and asked the patient to get an appointment as soon as possible for further evaluation and management. Unfortunately, the appointment he got was after 3 weeks. So the family physician ordered a polysomnography to bridge the gap.

## Discussion of Treatment Plan

At the sleep physician's appointment, the patient was informed that the PSG revealed an apnea-hypopnea index (AHI) of 44.5/hour. The sleep physician explained that AHI is a measure that quantifies the severity of sleep apnea by counting the number of apneas (no breathing) and hypopneas (shallow breathing) during sleep. A score of 30 events and over per hour indicated severe OSA. Following this, the patient was initiated on CPAP. He was also advised on weight loss measures.

## Outcome of Case

By the end of the first month of initiating CPAP therapy, the patient's sleep time had increased, his malaise disappeared, and the axillary temperature exhibited a gradual decrease. During the follow-up consultation, the patient reported resuming full-time work and feeling at ease. Additionally, he had started a regimen of thrice-weekly gym visits and was monitoring his dietary intake. Furthermore, there was an improvement in his HbA1c levels.

## Teaching Points

Unlike pediatric or adolescent patients, adults with functional hyperthermia have a low-grade fever and are not highly anxious, agitated, or impulsive regarding their stressors. Patients with OSA display significant sleep fragmentation, and chronic sleep fragmentation which may elevate the body temperature. CPAP improves sleep consolidation and may, thus, restore the body temperature.

**This case report highlights the following two important messages: (1) functional hyperthermia should be considered a possible cause of fever with a negative inflammatory response, and (2) OSA can be a stressor for functional hyperthermia.**

Chronic intermittent hypoxia followed by re-oxygenation significantly contributes to the development of several negative outcomes associated with obstructive sleep apnea (OSA). OSA is linked to various biological mechanisms, such as heightened cell apoptosis, excessive oxidative stress, and pronounced inflammation. While malaise commonly manifests as a

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symptom of OSA, hyperthermia is not typically observed. Hence, it's logical to consider OSA as a stressor leading to functional hyperthermia in this context. Addressing functional hyperthermia in adults necessitates a comprehensive approach that encompasses the treatment of accompanying conditions beyond hyperthermia itself.

*Adapted from: Maita H, Kobayashi T, Akimoto T, Osawa H, Kato H. Functional hyperthermia caused by obstructive sleep apnea syndrome: A case report. SAGE Open Med Case Rep. 2022 Sep 14;10:2050313X221123308. doi: 10.1177/2050313X221123308. PMID: 36119663; PMCID: PMC9478686.*

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## Additional Reading

- Oka K, Tokumasu K, Hagiya H, Otsuka F. Characteristics of Functional Hyperthermia Detected in an Outpatient Clinic for Fever of Unknown Origin. J Clin Med. 2024 Feb 3;13(3):889. doi: 10.3390/jcm13030889. PMID: 38337583; PMCID: PMC10856695.
- Oka T. Stress-induced hyperthermia and hypothermia. Handb Clin Neurol. 2018;157:599-621. doi: 10.1016/B978-0-444-64074-1.00035-5. PMID: 30459027.
- Lombardi C, Pengo MF, Parati G. Obstructive sleep apnea syndrome and autonomic dysfunction. Auton Neurosci. 2019 Nov;221:102563. doi: 10.1016/j.autneu.2019.102563. Epub 2019 Jul 10. PMID: 31445406.
- Friščić T, Vidović D, Alfirević I, Galić E. Impact of CPAP Therapy on the Autonomic Nervous System. Biomedicines. 2023 Dec 3;11(12):3210. doi: 10.3390/biomedicines11123210. PMID: 38137432; PMCID: PMC10740859.
- Paidi G, Beesetty A, Jean M, Aziz Greye FP, Siyam T, Fleming MF, Nealy J, Kop L, Sandhu R. The Management of Obstructive Sleep Apnea in Primary Care. Cureus. 2022 Jul 13;14(7):e26805. doi: 10.7759/cureus.26805. PMID: 35971363; PMCID: PMC9373878.

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